MINERALOGY AND PETROGRAPHY.[1]

Petrographical News.—Chrustschoff[2] has re-examined the rock of Island Wallamo, in Lake Ladoga, Finland, that was first described by Kutorga as a crystallized labrador-granite. Two varieties were recognized by Chrustschoff, the one a dark-brown dolerite, composed essentially of tabular plagioclase, idiomorphic pyroxene, olivine and a little glass, with sanidine surrounding the plagioclase, and quartz crystals embedded in micro-pegmatite, occurring in the interstices between the plagioclase crystals. The second type is a dark-green diabase-like rock, whose constituents are the same as those of the first-mentioned rock. In this quartz and orthoclase are rare. These rocks are cut by narrow dykes and veins of granophyre, without peculiar features. In explanation of these phenomena the author states that the original rock was an olivine diabase that had solidified, with the exception of its glassy ground mass, when it was intruded by granophyre. The acid magma partially dissolved the crystals and the unsolidified glass of the intruded rock, and so produced an orthoclase quartz aggregate. The basic plagioclase was corroded, and sanidine separated from the mixture formed by its solution in the acid magma, while the remaining acid material cooled as granophyre.——Deecke[3] gives a very detailed account of the geological and petrographical relationships of the gray tufa of the Campagna, Italy, which he believes to be a product of the volcanoes of the Phlegraean Fields. This tufa now consists of a colorless or pale yellow glass, in which are imbedded fragments and crystals of a very soda-rich sanidine, augite and biotite. The rock is thus an augite-trachyte. An analysis of the crystals of sanidine gave:

SiO_2	Al_2O_3	FeO	CaO	MgO	K_2O	Na_2O	Loss	Total
63.79	20.87	1.09	2.06	.41	7.56	3.72	.42	99.92

Besides the fragments of minerals there are also found enclosed in the tufa pieces of augite-trachyte, pumice and obsidian, fragments of hornblende-trachyte, and others of sedimentary rocks. A noticeable and very characteristic feature of the tufa that distinguishes it from others occurring in the same region, are the numerous geodes distributed in great numbers through its mass. These contain a yellowish powder, consisting of sanidine, tufa-fragments and fluorite. They are

[1]Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2]Geol. Fören. i. Stockh. Forh. 13, 1891, p. 149.

[3]Neues. Jahrb. f. Min., etc., 1891, I, p. 286.

supposed to have originated by the gradual decomposition of lapilli enclosed in the ash.——Hutchings[1] records the existence of tremolite and garnet in the flags at Shap, England, where they have been altered by the intrusion of granite through them. The tremolite is produced in the contact zone within the zone of spotted slates, and the garnet in about the same zone as the 'knoten,' but in different beds. The minerals producing the spots in the contact rocks are of different natures. In some cases white mica is the new product found, while in other cases it is probably andalusite. The clay slate needles that are present in large quantity in the unaltered flags continue to exist even in those rocks in which brown mica has begun to form. In the phases in which brown mica is abundant and newly-formed quartz is present the needles have disappeared, and in their place are found crystals and grains of rutile and sphene. In another stage of the contact action groups of large rutile crystals are observed, and in the neighborhood of spots are clusters of anatase crystals.——In central Siberia are mighty dykes and flows of basic rocks, among which Chrustschoff[2] recognizes ten types of augite—plagioclase—olivine rocks, containing more or less orthorhombic pyroxene and orthoclase. Their structure varies from the gabbroitic to the basaltic. Each type is described in detail and a photograph of it appears with the description. Even in the most glassy varieties well developed orthoclase exists. The principal structures noted are the gabbroitic, ophitic, with and without glassy base, anamesitic and aphanitic, with small crystals of feldspar. ——Mr. Rutley[3] describes very briefly a few sections of basalt or andesitic glass from Caradoc Hill, in Shropshire, Eng. At present the rock contains no olivine, but certain peculiar arrangements of magnetite grains indicate its former existence in them. With the glass are a basalt tufa and perlitic felsitic rhyolites with obscure flowage structure, and some with spherulites. An interesting spherulitic and perlitic obsidian is also described by the same author[4] from Pilas, Mexico. In this the perlitic cracks were certainly formed subsequently to the spherulites, and were afterwards filled with secondary silica and perhaps other substances.——Much of the so-called anthophyllite and actinolite in the rocks associated with the iron ores of the Lake Superior region is a monoclinic magnesian amphibole, corresponding to grü-

[1]Geol. Magazine, 1891, p. 459.

[2]Bull. d. l'Acad. Imp. des Sci., d. St. Petersb. Mél. géol. et paleont. T. I, p. 81.

[3]Quart. Jour. Geol. Soc., Nov., 1891, XLVII, p. 534.

[4]Ib. p. 530.

nerite, according to Messrs. Lane and Sharpless.[1] Its refraction is 1.7. It may easily be distinguished from actinolite by its polysynthetic twinning parallel to $\infty P\bar{\infty}$ and by its optical characteristics. It is colorless or pale green or brown, and is only faintly pleochroic. An approximately correct analysis gave:

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	$(NaK)_2O$	H_2O
76.32	.56	.99	6.96	12.47	tr.	2.80

Fibres of riebeckite or crocidolite have also been discovered by Lane as a secondary growth on the primary hornblende of a syenite from the S. E. ¼ of Sec. 17. T. 49, R. 25, W. in Michigan.——The principal types of olivine and anorthite skeleton crystals in some of the Vesuvian lavas have been well characterized by Rinne[2] in an article illustrated by thirty-eight figures. The olivine skeletons are elongated parallel to the axis *a*. Many are twinned, giving rise to various crosses, in one of which, whose arms intersect at nearly right angles, the twinning plane is $\infty \breve{P}2$, a new twinning law for this mineral. Intergrowths of olivine and plagioclase were noted. The anorthite skeletons often show crystallographic faces in grains no larger than .07 mm. in diameter.——Mr. Turner[3] gives a brief account of the geology of Mt. Diablo, in California, describing incidentally a uralitized diabase containing twinned augite, and in some places passing over into a diorite whose hornblende may be secondary, peridotites (lherzolites), pyroxenites (websterite) and gabbros, each of which has given rise to serpentine. In a supplement to Turner's paper, Dr. Melville records the results of the analysis of these rocks together with those of sandstones, shales and a glaucophane schist from the same region. The composition of the schist is as follows:

SiO_2	P_2O_5	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	K_2O	Na_2O	H_2O
47.84	.14	16.88	4.99	5.56	.56	11.15	7.89	.46	3.20	1.98

—A paleozoic leucite-rock, consisting of sanidine, augite, nepheline, and leucite, with the accessories anorthoclase, apatite, zircon and magnetite in a glassy base is mentioned by Chrustschoff[4] from a locality in Russia. The rock is aphanitic and resembles in appearance some of the Hohentwiel phonolites as well microscopically as in microscopic

[1] *Amer. Jour. Sci.*, Dec., 1891, p. 499.

[2] Neues. Jahrb. f. Min., etc., 1891, II, p. 272.

[3] Bull. Geol. Soc. Amer., 2, p. 383.

[4] Neues. Jahrb. f. Min., etc., 1891, II, p. 224.

structure. Sanidine phenocrysts, augite, anorthoclase and leucite lie in a ground mass of sanidine, nepheline and the other above-mentioned constituents.

Mineralogical News.—NEW MINERALS.—*Newtonite* and *Rectorite.*—Messrs. Brackett and J. F. Williams[1] suggest that the kaolinite group of minerals consists of four members, each containing one part of Al_2O_3, two of SiO_2, and one, two, three and four molecules of water respectively. The best-known of these are kaolin, with the composition $Al_2O_3\ 2SiO_2+2H_2O$, and halloysite, with an additional quantity of loosely combined water. The places of two other members they fill with the new minerals, newtonite and rectorite. The former occurs in lumps in a clay associated with the shales and sandstones of the Barren Coal Measures on Sneed's Creek in Arkansas. It is a pure white, soft, compact, infusible substance, with a density of 2.37. It is only slightly soluble in boiling HCl, but is easily decomposed by hot H_2SO_4 and by boiling NaOH. Under high powers of the microscope it appears to form rhombohedrons. Its analysis, calculated for the pure dry material, yielded $SiO_2 = 40.88$; $Al_2O_3 = 35.85$; Loss, $23.27 = Al_2O_3\ 2SiO_2 + 4H_2O$. Rectorite is found in veins in sandstone in the Blue Mountain District, about twenty-four miles North of Hot Springs, Ark. It is in soft white plates, closely resembling mountain leather. Its hardness is less than that of talc, and it is infusible. Upon heating it becomes brittle. The analysis, corrected for impurities, gives $SiO_2 = 54.67$; $Al_2O_3 = 37.22$; Loss $= 8.02$; or, if the excess of silica be regarded as an impurity, $SiO_2 = 49.99$; $Al_2O_3 = 41.16$; $H_2O = 8.84$; besides 8.78% of H_2O at 110°–115°. This corresponds to the first place in the series, viz.: $Al_2O_3\ 2SiO_2 + H_2O$ + Aq. The index of refraction for the substance is low. It possesses two cleavages inclined to each other, and its acute bisectrix is normal to one of these: ρ . The crystallization is thought to be monoclinic. Tested in the kiln the substance shows properties quite different from those of kaolin.——*Plumboferrite.*—The discovery of this mineral was announced by Igelström as long ago as 1881, but since it has not been noticed in journals outside of Sweden the discoverer[2] reannounces his discovery in a recent article in German. The mineral belongs to the franklinite group, from the other members of which it differs in containing lead in place of zinc or manganese.

[1] *Amer. Jour. Sci.*, July, 1891, p. 11.

[2] *Zeits. f. Kryst*, xix, p. 167.

It is found at Jakobsberg in black, platy masses, with a red streak similar to that of hematite. As usually found it is slightly magnetic, in consequence of the inclusion of impurities. It dissolves easily in HCl, and by H_2SO_4 it is changed to a white mass consisting principally of Pb SO_4.

Fe_2O_3	FeO	MnO	PbO	CaO	MgO	$CaCO_3$
55.58	9.83	2.00	21.29	1.55	1.80	7.95

which corrected for the $CaCO_3$ becomes

Fe_2O_3	FeO	MnO	CaO	MgO	PbO
60.38	10.68	2.20	1.67	1.95	23.12

corresponding to (PbO FeO MnO) Fe_2O_3.——*Ferro-goslarite* is a zinc sulphate from Webb City, Jasper Co., Mo., of the composition Zn SO_4 = 55.2; Fe SO_4 = 4.9; H_2O = 39.00; Impur = .8. According to Wheeler[1] it occurs as incrustations on the walls of a large body of zinc-blende, with which is associated marcasite and galena. Its formation is due to the oxidation of the zinc and iron sulphides and their subsequent crystallization from solution. It is slightly yellow to brown in color, and is brittle. Its hardness is 2.5, and it loses water on exposure to the air, turning to an opaque, yellow powder in the process. ——*Rowlandite.*—Associated with gadolinite and other yttrium minerals in Llano Co., Texas, Hidden[2] has found a pale drab-green substance that is transparent in thin splinters, and has a density of 4.515. It is easily soluble in acids, leaving a gelatinous residue. Upon alteration it yields a waxy, brick-red product. A partial analysis showed the presence of SiO_2 = 25.98; Y_2O_3 etc. = 61.91; FeO = 4.69; UO_3 = .40; CaO = .19; Loss = 2.01, indicating the formula $R_4'''(SiO_4)_3$.—*Offrétite*[3] is a new zeolite from the basalt of Mt. Simiouse, near Montbrison, in France. It occurs in very small, colorless, hexagonal crystals, with only the base and prism well developed. Their cleavage is basal. Density = 2.13 and composition:

SiO_2	Al_2O_3	CaO	K_2O	H_2O	
52.47	19.06	2.43	7.72	18.90	$= (K_2Ca)_2\ Al\ Si_{14} + 17\ H_2O.$

——*Morinite*[4] is a rose-colored mineral with a difficult cleavage par-

[1] *Amer. Jour. Sci.*, March, 1891, p. 212.

[2] *Amer. Jour. Sci.*, Nov., 1891, p. 430.

[3] Gonnard, Bull. Soc. France. d. Min. xiv. p. 58.

[4] Lacroix, Ib., xiv, p. 187.

allel to the triclinic $\infty P\breve{\infty}$. It is associated with amblygonite at Montebras, Creuse, France. Its crystals contain the three pinacoids, the prisms and several domes. The plane of their optical axis is parallel to $\infty P\bar{\infty}$, and the extinction in this face is 30°. The optical angle is variable, but it never exceeds 40°. The specific gravity is 2.94, and the mineral contains alumina, soda, phosphoric acid, fluorine and water. With it is associated another hydrated phosphate, crystallizing in pyramids.——*Darapskite, lauterite, iodchromate.*—Dietze[1] describes several new minerals from the Pampas Lantaro in Chile. The first mentioned is a double salt of sodium nitrate and sulphate, of the formula $NaNO_3 + Na_2SO_4 + H_2O$. It contains $SO_3 = 32.88$; $N_2O_5 = 22.26$; $Na_2O = 38.27$; $H_2O = 7.30$. The mineral is clear and colorless, and is in quadratic tables. Lauterite is particularly interesting as being the first iodate known to occur in nature. Its composition [$I = 64.70$; $CaO = 14.95$] corresponds to $Ca(IO_3)_2$. It occurs in well-developed, large prisms, apparently monoclinic, imbedded in gypsum or implanted in the rocks underlying the pampa. It is transparent and of a yellowish color. Its density is 4.59, and it dissolves quite readily in water. Iodchromate is a peculiar compound in that it is a double salt of the iodate and chromate of calcium, of the formula $7\,Ca(IO_3)_2 + 8\,CaCrO_4$. One analysis gave $I_2O_5 = 58.12$; $CrO_3 = 19.00$; $CaO = 22.01$. The crystals are badly developed. They are of a deep yellow color, and they dissolve easily in water.——*Paramelaconite* and *Footeite.*—Dr. Foote recently obtained from Bisby, Arizona, several specimens affording two new minerals that have been examined by Koenig.[2] One is in bronzy, pyramidal crystals, set in a mass of indigo blue needles, implanted on a mammillary substance composed of a mixture of cuprite and limonite. The dark crystals, named *paramelaconite*, are tetragonal, with a pyramidal habit resembling that of Brazilian anatase, and an axial ratio $a : c = 1 : 1.6643$. The hardness of the new mineral is the same as that of apatite. Its streak is black, and its analysis yielded: $CuO = 87.66$; $Cu_2O = 11.70$; $Fe_2O_3 = .64$. Since the CuO is in such large quantity and since it was found to include little particles of cuprite, the author concludes that the mineral is a dimorph of melaconite. The indigo blue needles are monoclinic combinations of $\infty P\breve{\infty}$, $\infty P \between P$, $P\breve{\infty}$ and $P\bar{\infty}$, with an hexagonal habit. Many of the crystals are twins, like those of harmotome. Their composition

[1] *Zeits. f. Kryst*, xix, 1891, p. 447.

[2] *Zeits. f. Kryst*, xix, p. 595.

($CuO = 63.7$; $Cu\,Cl_2 = 13.5$; $H_2O = 22.8$) leads to the formula $8[Cu(HO)_2]CuCl_2 + 4H_2O$. The name chosen for them is Footeite, after their discoverer.——*Rumpfite.*—On the clefts of pinolite, from Jassing, in Obersteiermark, Germany, Firtsch[1] found associated with talc a flaky, greenish-white, translucent mineral with a hardness of 1.5 and a density of 2.675. Under the microscope it appears to be uniaxial and hexagonal. Its composition is:

SiO_2	Al_2O_3	FeO	CaO	MgO	H_2O	Total
30.75	41.66	1.61	.89	12.09	13.12	= 100.12,

corresponding to $H_{28}\,Mg_7\,Al_{16}\,Si_{10}O_{65}$. It deports itself like a chlorite.——*Bolleite.*—Mallard and Cumenge[2] have found among the copper series of Boleo, near Santa Rosalie, in Lower California, a large quantity of a blue copper mineral that often crystallizes in cubes and octohedrons. It is associated with auglesite, cerussite, atacamite and gypsum. An analysis of the cubical forms gave:

Ag	Cu	Pb	Cl	Aq	O(by diff.)
8.80	14.22	49.10	19.48	4.38	4.02,

corresponding to $Pb\,Cl_2 + CuO\,H_2O + \frac{1}{3}\,Ag\,Cl$ or $3[Pb\,Cl(HO).\,Cu\,Cl(HO)] + Ag\,Cl$. The hardness of the crystals is but little superior to that of calcite. Their density = 5.08 and their index of rafraction is about 2.07. Sometimes the cubes are modified by the dodecahedron, but the dodecahedral faces have not their usual positions, that one most steeply inclined to each axis occurring nearer the termination of that axis than the one less steeply inclined thereto, so that the edges of the cube are replaced by pairs of two faces making re-entering angles with each other. The optical properties of thin sections of these crystals indicate that they are tetragonal, negative forms that unite to give rise to a pseudo-regular one. The octahedral crystals are in reality tetragonal pyramids with $a : c = 1 : .9873$. Boleite differs from percylite in containing silver.——Sjögren[3] describes three new minerals from Sweden. The first, *astochite,* occurs as a coarse, columnar aggregate of a blue or grayish violet color at Langban. Its cleavage is that of hornblende. Its density varies

[1]Sitzb. Wien, Ak. 99, 1890, p. 1. Ref. Neues. Jahrb. f. Min., etc., 1892, I, p. 31.

[2]Bull. de la Soc. Franc. d. Min. xiv. p. 283.

[3]Geol. Fören. i. Stock. Förh. xiii, 1891, pp. 605 and 781.

between 3.05–3.10, and its extinction between 15°40′ and 17°15′. The analysis of the blue variety yielded:

SiO_2	FeO	MnO	MgO	CaO	Na_2O	K_2O	H_2O	F = Total
56.25	.15	6.49	21.89	5.44	6.17	1.60	1.56	.15 = 99.70

The second, *adelite*, occurs at Laugban and at Nordmark in mass of a gray color, with a hardness of 5 and a density of 3.76. Its analysis leads to the formula 2CaO, 2MgO, H_2O, As_2O_5. The third, *svabite*, is probably an apatite. It is found in colorless hexagonal prisms at Harstig Mine, Pajsberg. $a : c = 1 : .7143$. Composition = H_2O. $10CaO.\ 3As_2O_5$.

BOTANY.

The Sargasso Sea.—In a recent number of Petermann's 'Mitteilungen' Dr. O. Krümmel states the result of his investigations into this interesting marine problem. In the first place, he differs entirely from Humboldt as to the shape of the floating mass of vegetation. The "great bank of Flores and Corvo" is, he says, Humboldt's summing up of the observations made by sailing-vessels passing through the Sargasso Sea on their way from the Southern hemisphere to Europe. These followed with slight variations the same course, and their observations were naturally limited in extent. It was on these insufficient data that Humboldt founded his theories as to the size and shape of the Sargasso Sea, but now, by the aid of steam, we are able to arrive at more correct conclusions on these points. On a map which he has prepared Dr. Krümmel has plotted out the general contour of the mass of floating vegetation, and has indicated in what parts of the sea the sargasso is found in the greatest abundance. In shape the Sargasso Sea is a sort of ellipse, the great axis of which almost coincides with the Tropic of Cancer, while the two foci are near long. 45° and 70° West. Around this central ellipse others are indicated, larger in size, but with the vegetation much less dense. In their general outline they follow with sufficient nearness the course of the prevailing winds. As to the origin of the algæ, Dr. Krümmel is strongly of the opinion that they come from the land—not only from the Gulf of Mexico and the coast of Florida, but from the shores of the Antilles and the Bahamas. The most recent studies with regard to the origin and course of the Gulf Stream tend, he thinks, strongly to support those who assert that the algæ come from the land, and to disprove the contention of those